UHF amplifier module BGY916/5

FEATURES

- 26 V nominal supply voltage
- 5 V nominal bias voltage
- 16 W output power into a load of 50 Ω with an RF drive power of 25 mW.

APPLICATIONS

- Base station transmitting equipment operating in the 920 to 960 MHz frequency range.

DESCRIPTION

The BGY916/5 is a three-stage UHF amplifier module in a SOT365A package. It consists of one NPN silicon planar transistor die and two silicon MOS-FET dies mounted on a metallized ceramic AlN substrate, together with matching and bias circuitry.

PINNING SOT365A

PIN	DESCRIPTION
1	RF input
2	V_{S1} (bias)
3	V_{S2}
4	RF output
flange	ground

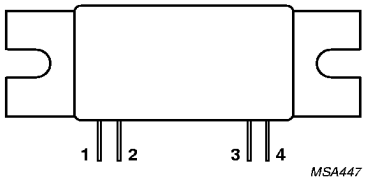


Fig.1 Simplified outline

QUICK REFERENCE DATA

RF performance at T_{mb} = 25 °C.

MODE OF OPERATION	f (MHz)	V_{S1} (V)	V_{S2} (V)	P_L (W)	G_p (dB)	η (%)	Z_S; Z_L (Ω)
CW	920 to 960	5	26	16	≥28	≥35	50

LIMITING VALUES

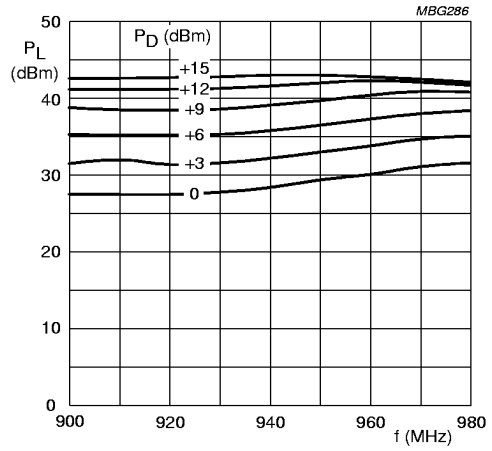
In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{S1}	DC supply voltage	–	5.5	V
V_{S2}	DC supply voltage	–	28	V
P_D	input drive power	–	80	mW
P_L	load power	–	25	W
T_{stg}	storage temperature	–30	+100	°C
T_{mb}	operating mounting base temperature	–10	+90	°C

CHARACTERISTICS

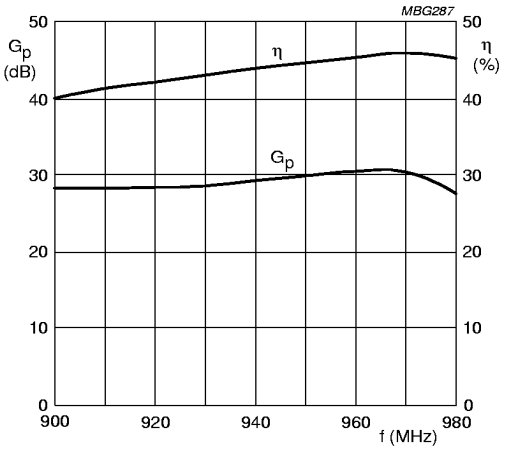
T_{mb} = 25 °C; V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; $Z_S = Z_L$ = 50 Ω unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f	frequency		920	–	960	MHz
I_{S1}	supply current		–	50	–	mA
I_{S2}	supply current	P_D < –60 dBm	–	150	–	mA
P_L	load power	P_D = 25 mW (14 dBm)	16	19	–	W
G_p	power gain		28	30	32	dB
ΔG_p	gain ripple	40 dB dynamic range at f = 920 to 960 MHz	–	1	4	dB
η	efficiency		35	40	–	%
H_2	second harmonic		–	–47	–35	dBc
H_3	third harmonic		–	–55	–45	dBc
$VSWR_{in}$	input VSWR		–	1.5 : 1	2 : 1	
	isolation	V_{S1} = 0	–	–	–40	dBm
	stability	VSWR ≤ 3 : 1 through all phases; V_{S2} = 24 to 26 V	–	–	–60	dBc
	reverse intermodulation	$P_{carrier}$ = 16 W; $P_{interference}$ = 16 μW; $f_i = f_c \pm 600$ kHz	–	–68	–65	dBc
F	noise figure		–	5	8	dBc
B	AM bandwidth	At 3 dB corner frequency; $P_{carrier}$ = 16 W; modulation = 20 %	2	–	–	MHz
	ruggedness	VSWR ≤ 5 : 1 through all phases	no degradation			



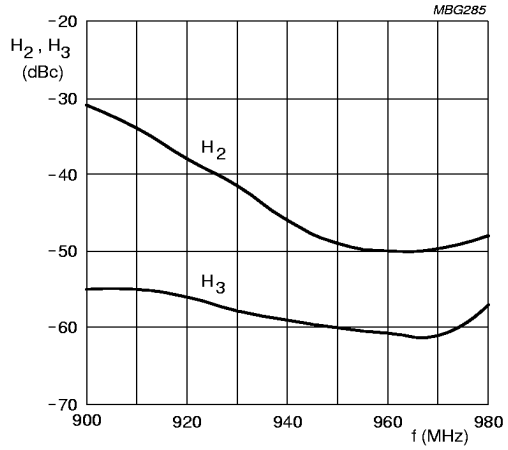
V_{S1} = 5 V; V_{S2} = 26 V; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.2 Load power as a function of frequency; typical values.



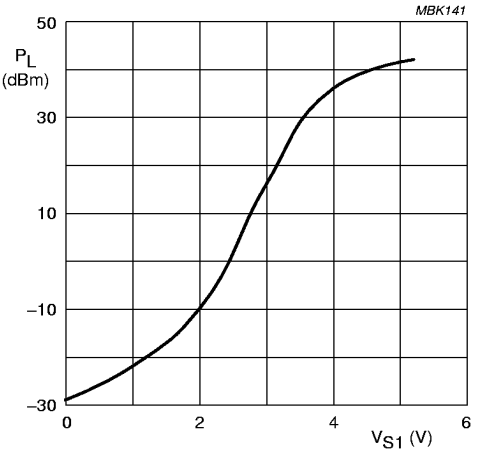
V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.3 Power gain and efficiency as functions of frequency; typical values.



V_{S1} = 5 V; V_{S2} = 26 V; P_L = 16 W; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.4 Harmonics as a function of frequency; typical values.



f = 940 MHz; V_{S2} = 26 V; Z_S = Z_L = 50 Ω; T_{mb} = 25 °C.

Fig.5 Load power as a function of supply voltage; typical values.

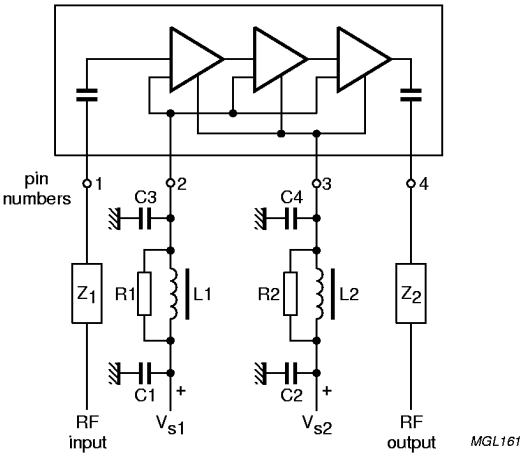


Fig.6 Test circuit.

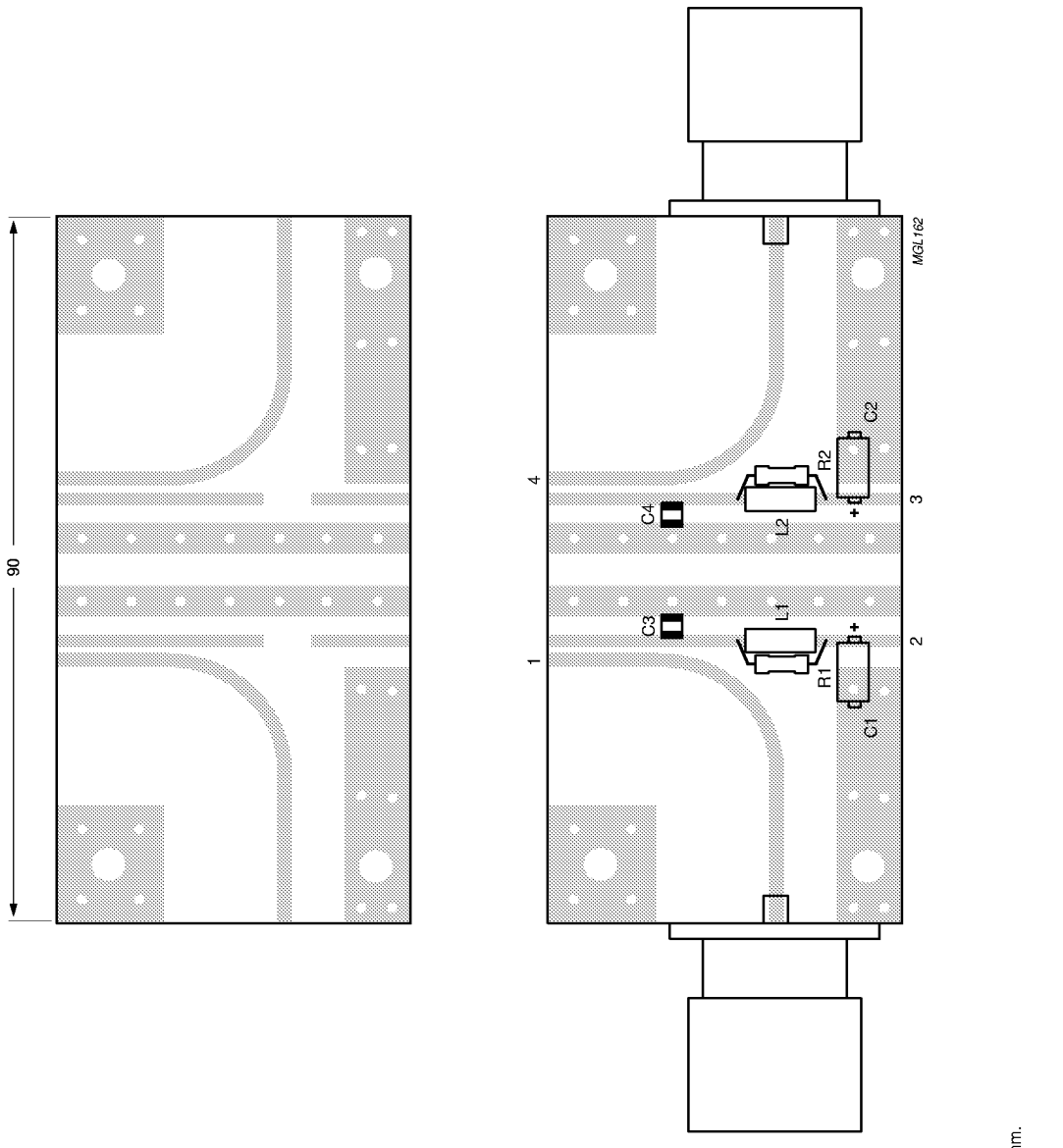


Fig.7 Printed-circuit board component layout.

List of components (see Figs 6 and 7)

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C2	electrolytic capacitor	10 μF; 35 V	
C3, C4	multilayer ceramic chip capacitor	100 nF; 50 V	
L1, L2	Grade 4S2 Ferroxcube bead		4330 030 36300
R1, R2	metal film resistor	10 Ω; 0.4 W	2322 195 13109
Z_1, Z_2	stripline; note 1	50 Ω	–

Note

1. The striplines are on a double copper-clad printed-circuit board with epoxy dielectric (ε_r = 4.5); thickness = 1 mm.

MOUNTING RECOMMENDATIONS

To ensure a good thermal contact and to prevent mechanical stresses when bolted down, the flatness of the mounting base is designed to be typically better than 0.1 mm. The mounting area of the heatsink should be flat and free from burrs and loose particles. The heatsink should be rigid and not prone to bowing under thermal cycling conditions. The thickness of a solid heatsink should be not less than 5 mm to ensure a rigid assembly.

A thin, even layer of thermal compound should be used between the mounting base and the heatsink to achieve the best possible contact thermal resistance. Excessive use of thermal compound will result in an increase in thermal resistance and possible bowing of the mounting base; too little will also result in poor thermal conduction.

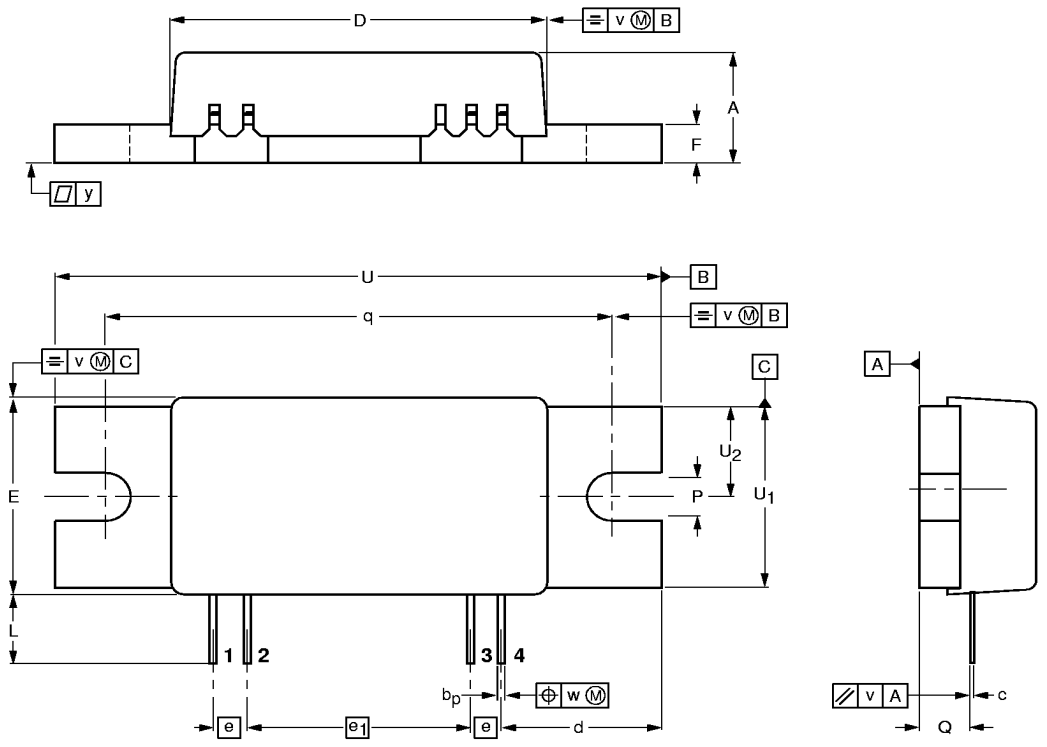
The module should be mounted to the heatsink using 3 mm bolts with flat washers. The bolts should first be tightened to “finger tight” and then further tightened in alternating steps to a maximum torque of 0.4 to 0.6 Nm.

Once mounted on the heatsink, the module leads can be soldered to the printed-circuit board. A soldering iron may be used up to a temperature of 250 °C for a maximum of 10 seconds at a distance of 2 mm from the plastic cap.

ESD precautions must be taken to protect the device from electrostatic damage.

PACKAGE OUTLINE

Plastic rectangular single-ended flat package; flange mounted; 2 mounting holes; 4 in-line leads SOT365A



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	d	E	e	e_1	F	L	P	Q	q	U	U_1	U_2	v	w	y
mm	9.5 9.0	0.56 0.46	0.3 0.2	30.1 29.9	12.8 12.6	18.6 18.4	2.54	17.78	3.25 3.15	6.5 6.1	4.1 3.9	4.0 3.8	40.74 40.54	48.0 48.4	15.4 15.2	7.75 7.55	0.2	0.25	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT365A						97-05-25